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# Disability income insurance premiums: An investigation of the decision to pre-tax or post-tax the premiums

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**Abstract**

Individuals who pre-tax their disability insurance premiums must pay tax on any disability benefits they receive. However, individuals who pay for the insurance with after tax dollars may exclude the benefits from their taxable income. In this paper, we investigate whether the expected tax savings are greater for individuals who pre-tax or post-tax disability income insurance premiums. Using disability statistics from the Commissioners Income Disability Table, expected values of tax savings are computed for various income levels and age groups. Generally, younger individuals with lower incomes achieve a reduction in expected taxes if they pre-tax the disability income insurance premiums. Older individuals with higher incomes often achieve a reduction in expected taxes when they pay for disability insurance premiums with post-tax dollars. Individuals who have just entered a higher tax bracket in the year of the insurance payments often achieve a tax savings by pre-taxing the premiums. Finally, individuals with substantial other income besides his or her salary, generally are better off to post-tax the premiums. 

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*Keywords:* Disability insurance; Tax planning

## 1. Introduction

For many individuals, the risk of becoming either temporarily or permanently disabled in a given year is greater than the risk of death. Jones (2002) reports that a 30-year-old woman has a 57% chance of becoming disabled for a period of time before age 65, but only a 16%

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chance of dying before age 65. Many individuals seek to manage their risk of a disabling accident or disease by purchasing disability income insurance.

The taxation of disability insurance premiums and disability benefits presents individuals with an interesting dilemma. If the disability income insurance is purchased with pre-tax dollars, the benefits are taxable when received. On the other hand, if the disability income insurance is purchased with post-tax dollars, the benefits are generally non-taxable when received. The difference in the taxation of the disability insurance premiums and the receipt of the disability income raises the question of which tax treatment an individual should choose.

Kim (2003) suggests that disability insurance premiums should be paid for with post-tax dollars to gain the advantage of non-taxable benefits if the individual becomes disabled. However, this choice increases the tax in the year the premium is paid. Moreover, if an individual never becomes disabled, this increase in tax is permanently lost. To date, there has been no research that quantifies the tradeoff in the decision to pre-tax or post-tax disability income insurance premiums. In this paper, we model the expected value of the pre-tax/post-tax decision for individuals at various income levels. Using statistics from the 1985 Commissioner's Individual Disability Table, our model takes into account the probability of an individual being disabled, the duration of the disability, the cost of the disability insurance premiums, and the tax implications of whether the premiums are paid with pre-tax or post-tax dollars. We also discuss the findings from the perspective of expected utility theory.

The remainder of the paper is organized as follows. The next section discusses the history of the disability insurance industry in the United States. This is followed by a discussion of the taxation of disability insurance premiums and benefits. We then present our research design. We conclude with our results and suggestions for future research.

## 2. History of disability income insurance industry

Although disability income coverage appeared as riders to life insurance contracts in the 19th century, disability income policies came into their own as separate products in the early 20th century (Soule, 2002). Many of the early companies selling disability income insurance policies were life insurance companies who saw this as way to generate income by adding this new product. Although most life insurance companies had a clear understanding of the risks associated with life insurance contracts, they were unfamiliar with the risks associated with disability income insurance policies. Companies that had too liberal of a definition of "disability" paid out such large amounts that they were unable to stay in business. On the other hand, companies that had too restrictive of a definition of disability were unable to sell policies.

Many of the provisions in current disability income insurance policies developed over time. For example, until the early 1950s, disability benefits often terminated (or were reduced by half) at age 60 (Soule, 2002, p. 7). Today, disability benefits generally continue until age 65, although some insurers are increasing the age to 67 as the age to qualify for full Social Security benefits increases. The date when disability benefits terminate is important to the

choice of tax treatments that an individual elects, particularly for individuals who are close to the termination date.

Another change in the disability insurance industry was brought about by the initiation of disability benefits under the Social Security program in 1956 and subsequent modifications to the program (Soule, 2002, p. 11). The definition of disability, a key factor in a disability income insurance contract, is defined by the Social Security Administration as either "(A) the inability to engage in any substantial gainful activity by reason of any medically determinable physical or mental impairment which can be expected to result in death or has lasted or can be expected to last for a continuous period of not less than 12 months, or (B) blindness" [Social Security Act § 216(i)(1)].[1] However, most private disability insurers generally define disability as an individual being unable to work in his or her *own occupation* or based on education, training, and experience (Soule, 2002, p. 91). The difference in the definition of disability, plus the funding formula for Social Security Disability Insurance (SSDI) benefits, generally results in private insurer's conceding the non-occupational disability insurance market to Social Security. Private disability insurers generally cater to the professional market. We focus our analysis in this paper on private disability insurance where an individual may be presented with the conundrum of whether to pre-tax or post-tax the disability insurance premiums.

Although most of the academic research in the area of disability insurance has focused on Social Security Disability Insurance (SSDI), many of the findings are also important in the area of private disability insurance. For example, Hoynes and Moffitt (1999) use a numerical simulation to explain some of the disincentives to work that exist in the current SSDI program. Autor and Duggan (2007) bifurcate this disincentive into income effects and substitution effects. Under the SSDI rules, an individual who has a physical disability, but earns income above the statutory amount, may have to forego collecting Social Security disability benefits. This provides a disincentive for that person to work. Bound (1989) examines data for individuals rejected by SSDI and finds that many of those do not return to work even though they are not collecting disability benefits.

Another critical issue is the replacement rate of income that the disability insurance provides. Using data from the Current Population Survey, Autor and Duggan (2003) report that rising replacement rates of SSDI benefits are positively associated with an increase in the number of SSDI recipients. That is, the greater the portion of the individual's income that is replaced by the disability income, the more incentive the individual has to exit the workforce and file for disability income. Danzon (1993) concludes that disability benefits create incentives for fraudulent claims and reduction in labor force participation. Although the research pertains to SSDI recipients, a similar conclusion might also be reached for recipients of private disability insurance. To alleviate this problem, Cox (1991) states that most disability insurance pays only a portion of salary in the event of disability, typically 50% or 60%.

## 3. Taxation of disability income insurance premiums and benefits

The federal income taxation of insurance benefits depends on whether the premiums were paid for with pre-tax or post-tax dollars. At one end of the spectrum are individual disability

policies where the individual contracts with a disability insurer and pays for the policy with post-tax dollars. Section 104(a)(3) of the Internal Revenue Code provides that if an individual pays for disability insurance with after-tax dollars and becomes disabled, the amounts received are excludable from taxable income. A second method of financing disability insurance is that they may be paid entirely by the employer. Although payments for disability insurance that are paid for by the employer are excludable from the employee's income in the year the premiums are paid, any benefits are taxable when received (Treas. Reg. 1.104–1).

A third method of purchasing disability income insurance is through an employer's benefits plan. Halpin and Brinker (2003) discuss employer benefit plans that give employees a choice of taking cash or selecting from two or more qualified benefits. Generally, these benefits will be excluded from gross income of the employee. This results in the employee paying for these benefits with pre-tax dollars to the extent allowed by the federal income tax law.

As stated above, the tax rule for disability insurance is that if an employee pays for the disability insurance with pre-tax dollars, then any disability benefits received are taxable. Conversely, if the premiums are paid with post-tax dollars, then the benefits will be non-taxable. In Rev. Rul. 2004–55, the Internal Revenue Service approved an employer benefits plan that was amended to allow the employees to elect annually whether to pay for long-term disability insurance with either pre-tax or post-tax dollars. Therefore, on an annual basis, the employee must make a decision whether to pre-tax or post-tax disability insurance premiums. The opportunity to make the election to pre-tax or post-tax the premiums on an annual basis is critical to our model. This allows an individual to change status (from pre-tax to post-tax or vice versa) whenever it is economically advantageous to change the tax status of the premiums.

Kim (2003) suggests that disability insurance premiums should be paid for with post-tax dollars to gain the advantage of non-taxable benefits if the individual becomes disabled. However, individuals are generally in higher tax brackets during working years than in years when they collect disability income. In addition, if an individual's sole source of income is non-taxable disability benefits, then he or she would lose the advantage of the standard deduction (or itemized deductions if they exceed the standard deduction) and exemptions during the year of the receipt of the disability benefits if the benefits were excluded from income.

Luecke and Blair (2003) refer to the tradeoff decision of whether to pre-tax or post-tax the contributions as tax efficiency versus wage replacement. In their analysis, they use three simple cases to demonstrate tax efficiency and wage replacement. They define tax efficiency as the tax savings from pre-taxing the disability insurance premiums in the year of payment. For example, an individual in the 25% tax bracket who pre-taxed a disability income insurance premium of $100 would have a tax efficiency of $25. Luecke and Blair define wage replacement as the increase in post-tax income in the year the individual is disabled and collects disability benefits.

Luecke and Blair conclude that the tax savings from paying for the disability insurance with post-tax dollars is minute in comparison with the extra tax that would be paid if an individual was disabled and had to pay tax on the disability benefits. However, their analysis

is incomplete in a couple of areas. Although they do include a table that shows the probability of a disabling event at selected ages, they do not incorporate the data into their analysis. In addition, they do not incorporate the mean time period that a person might expect a disability to last.

Based upon limitations of previous research, we believe that a thorough investigation of the decision to post-tax or pre-tax disability insurance premiums is in order. In the next section of the paper, we formulate our research design to quantify the decision of whether an individual should elect to post-tax or pre-tax disability insurance premiums.

## 4. Research design

### *4.1. Methodology*

The decision of whether to pre-tax or post-tax disability income insurance premiums is influenced by (1) federal income tax law (including the rate structure of the tax law), (2) the income level of the insured, (3) the amount of the disability insurance premium, (4) the probability of the insured becoming disabled, and (5) the expected duration of time that the individual will collect disability income benefits. In this paper, we compare the income tax saved by pre-taxing disability income insurance premiums with the expected value of the increase in tax caused by the disability benefits being taxable.

For simplicity, we assume a two-period model where the premiums are paid in period 1 and the disability benefits begin in period 2. We use an income tax calculator program for 2007 to compute income tax in period 1 under two alternatives. The first alternative is that the disability insurance premiums are paid with pre-tax dollars whereas the second alternative is that the disability insurance premiums are paid with post-tax dollars. We define TS1 as the amount of tax that is saved in period 1 when the premiums are paid with pre-tax dollars.

As previously discussed, pre-taxing the disability insurance premiums in time period 1 causes the receipt of disability income benefits to be taxable in the year of receipt. We compute the tax in time-period 2 under the alternatives (1) the disability insurance premiums are paid with pre-tax and (2) the disability insurance premiums are paid with post-tax dollars. We define TC2 as the additional tax cost in time-period 2 when the disability income insurance premiums are paid with pre-tax dollars.

Not all individuals who purchase disability income insurance will become disabled. Therefore, we compute the expected value of the increase in tax in time-period 2 by multiplying TC2 by the probability of an individual becoming disabled, multiplied by the number of years the individual is expected to be disabled (discounted by an appropriate discount rate as discussed in the results section).

We use data from the 1985 Commissioner's Individual Disability Table that provide the probability of an individual becoming disabled during the year and the mean duration of the disability. Under an expected value model, an individual should elect to pay for the disability income insurance premiums with pre-tax dollars when the tax savings in time-period 1 exceeds the present value of the expected tax cost in time-period 2, or

$$TS1 > (Dis_{prob}) \times (Dis_{time}) \times (TC2) \quad (1)$$

where,

TS1 = The tax savings in period 1 when the premiums are paid with pre-tax dollars
TC2 = The additional tax in period 2 when the disability income is subject to tax
$Dis_{prob}$ = the probability that an individual will become disabled in period 1
$Dis_{time}$ = The mean length of time the individual is expected to collect disability benefits (less a six-month elimination period)

### *4.2. Factors affecting the decision*

#### *4.2.1. U.S. income tax law*

The structure of the U.S. income tax law plays a major part in the decision of whether to pre-tax or post-tax disability income insurance premiums. The income tax system has a graduated rate scale so that higher levels of income are taxed at higher rates. The marginal income tax rate is important because if an individual elects to pay the disability income insurance premiums with pre-tax dollars, he or she saves an amount of tax equal to the amount of the premiums times the marginal tax rate he or she pays that year. That is, individuals with greater incomes will have greater tax savings in time-period 1 by pre-taxing the benefits. However, individuals with higher incomes will be subject to higher tax on the disability benefits they receive if they pre-tax the premiums.

For federal income tax purposes, there are four filing statuses for individuals: (1) single, (2) married filing jointly (including surviving spouses), (3) married filing separately, and (4) head of household. For 2007, there are seven income tax rates for individuals ranging from 0% for low levels of income to 35% for high levels of income. Although the tax rates for the four filing statuses are the same, the amount of income required to move to the next level varies by filing status. U.S. Department of the Treasury (2007) shows that for 2006, 85% of all individuals filed as either single or married filing jointly (including surviving spouse). Therefore, we limit our analysis to these two filing statuses.

#### *4.2.2. Income level of the insured*

An individual's income level affects the decision to pre-tax or post-tax the premiums in two ways. First, higher income levels are subject to higher income tax rates. Therefore, the higher the income level, the greater the tax savings for pre-taxing the premiums for each dollar of premiums paid. Second, at higher income levels individuals generally purchase more disability income coverage because the coverage is a percentage of income. For our analysis we use a benefits level of 60% of income, consistent with Luecke and Blair (2003). This is generally the largest percentage that most insurers will insure.

For our analysis, we examine the effects of the decision to pre-tax or post-tax disability income insurance premiums for income levels from $25,000 to $150,000 in $25,000 increments. This is a robust range of income to determine the effects of the decision to elect to pay the premiums from pre-tax or post-tax income.

Table 1 Probability of becoming disabled and mean number of years of disability at selected ages

| Age | Probability of becoming disabled during the year | Mean number of years of disability |
|---|---|---|
| 22 | .00080 | 7.5017 |
| 27 | .00089 | 8.3100 |
| 32 | .00105 | 9.3068 |
| 37 | .00137 | 10.2617 |
| 42 | .00202 | 10.5779 |
| 47 | .00356 | 9.6689 |
| 52 | .00662 | 6.4508 |
| 57 | .01187 | 5.8766 |
| 62 | .01681 | 2.7196 |

*Note*. The mean number of years of disability has been adjusted so that the individual cannot receive disability benefits past age 65, the age when disability benefits generally expire. This affects individuals age 42 and over, with the most significant effects for individuals in the age 62 category.

#### *4.2.3. The amount of the premium*

Disability insurance premiums are rated based on numerous factors. Soule (2002, p. 235) lists age, income, occupation class, gender, marital status, and health as some of the factors that are considered in setting disability income insurance rates.

In a study of the pricing of disability income policies, Cox and Gustavson (1995) examined prices for 54 insurers for 1988 and found considerable variance in rates for individuals age 35.[2] Soule (2002, p. 124) provides updated information on pricing disability income policies. He states "Most disability insurers offer similar levels of indemnity for the same amount of earned income, most companies' premium structure is similar, and most contractual language is quite similar." For our analysis, we use a rate schedule for disability income insurance for professional occupations from a major provider of disability income insurance.

#### *4.2.4. Probability of the insured becoming disabled*

At each given age, there is a probability that an insured will have a disabling accident or illness. However, as Soule (2002) notes, there is little information on disability experience. The 1985 Commissioner's Individual Disability Table, gathered from the experiences of the eight major disability insurers, provides data on the risk of an individual suffering a long term disability. It contains information on the number of disability claims beginning at age 22 and in five-year increments. Because the 1985 Commissioner's Individual Disability Table is the most comprehensive data available, we use these data in this study. Table 1 contains the annual probabilities of a person becoming disabled from age 22 to age 62 in five-year increments.

As shown in Table 1, the probability that an individual will become disabled during the year ranges from a low of 0.00080 for an individual age 22 to a high of 0.01681 for an individual age 62. Although the probability that an individual may become disabled in a particular year is quite low, the probability that an individual may become disabled at some point in his or her work life is much greater.

*4.2.5. Duration of the disability*

In addition to the probability of an individual becoming disabled, the expected amount of time that the individual will be disabled is critical to the decision to pre-tax or post-tax the disability insurance premiums. In a comparison of life insurance and disability insurance, Cox, Gustavson and Stam (1991) find that the length of time an individual is disabled is a significant factor in determining the severity of the loss incurred. The most complete data for the average length of time of disabilities is the 1985 Commissioner's Individual Disability Table. Therefore, we use these data in our study.

In general, older individuals have a higher mean length of disability than younger individuals. This is shown in Table 1 where individuals age 22 have a mean length of disability of 7.5017 years. However, because most disability insurance policies pay only until age 65, we limit the payout period until the individual reaches age 65. The effect of truncating the benefit period is responsible for the decrease in the mean expected length of disability beginning at age 47 and is most noticeable in the group age 62. Although the actual mean number of years of disability for individuals age 62 is 7.5037 years, the mean time period is adjusted to 2.7196 years to remove the effect of disabilities that extend past an individual's 65th birthday. The probabilities of an individual becoming disabled and the mean duration of the disability, at each given age, are shown in Table 1.

## 5. Results

We compute the tax liability in the year the premium was paid for each income level and for two filing statuses (single and married filing jointly) assuming the taxpayers use the standard deduction and are allowed one exemption for the taxpayer (and an additional exemption for the spouse for the married filing jointly category). For all computations, we use an income tax calculator program with 2007 rates and law. The amount of tax for a given level of income, assuming the disability insurance premiums are paid with post-tax dollars, is designated as $\text{Tax1}_{\text{post}}$. We then re-compute the tax for each income level and filing status with the same assumptions except the individual is allowed to exclude an amount of income equal to the premiums paid for a disability income insurance contract that will fund a benefit level of 60%.[3] This equates to a taxpayer electing to pay for the disability insurance with pre-tax dollars. For this computation, the age of the individual is important because age is one of the factors used to price disability income insurance. A disability insurance contract for an individual age 62 to fund a benefit of $60,000 per year is higher, *ceteris paribus*, than a similar policy for a 22 year-old individual.

We compute $\text{Tax1}_{\text{pre}}$ and $\text{Tax1}_{\text{post}}$ for two filing statuses (married filing jointly and single), six income levels, and six age categories. The amount of tax savings achieved by pre-taxing the disability income insurance premiums in period 1 (TS1) is equal to $\text{Tax1}_{\text{post}}$ minus $\text{Tax1}_{\text{pre}}$.

Next, we compute the individual's income tax for period 2 assuming that he or she becomes disabled and collects disability income benefits at a level of 60% of earnings. In this step, we compute tax under two alternatives: (1) premiums are paid with pre-tax dollars ($\text{Tax2}_{\text{pre}}$) or (2) premiums are paid with post-tax dollars ($\text{Tax2}_{\text{post}}$). For $\text{Tax2}_{\text{pre}}$, the

Table 2 Individuals age 42: Six month elimination period

| Panel A: Single individuals | | | | |
|---|---|---|---|---|
| Income | Year of payment | | Year of receipt | |
| Levels | $Tax1_{pre}$ | $Tax1_{post}$ | $Tax2_{pre}$ | $Tax2_{post}$ |
| 25,000 | 2,028 | 2,046 | 625 | 0 |
| 50,000 | 6,677 | 6,736 | 2,796 | 0 |
| 75,000 | 12,897 | 12,896 | 5,486 | 0 |
| 100,000 | 19,578 | 19,661 | 9,236 | 0 |
| 125,000 | 26,495 | 26,661 | 12,986 | 0 |
| 150,000 | 33,462 | 33,661 | 16,861 | 0 |
| Panel B: Married individuals filing joint tax returns | | | | |
| Income | Year of payment | | Year of receipt | |
| Levels | $Tax1_{pre}$ | $Tax1_{post}$ | $Tax2_{pre}$ | $Tax2_{post}$ |
| 25,000 | 738 | 750 | 0 | 0 |
| 50,000 | 4,057 | 4,093 | 1,250 | 0 |
| 75,000 | 7,789 | 7,843 | 3,343 | 0 |
| 100,000 | 13,354 | 13,473 | 5,593 | 0 |
| 125,000 | 19,574 | 19,723 | 7,843 | 0 |
| 150,000 | 25,893 | 26,093 | 10,973 | 0 |

disability income is included in taxable income. $Tax2_{pre}$ is computed on the income less the standard deduction and exemption amounts for 2007.

For $Tax2_{post}$, disability income is not included in taxable income because the premiums were not excluded from income when paid. For both filing statuses, all income levels, and all ages, there is no taxable income and no income tax. The difference between $Tax2_{pre}$ and $Tax2_{post}$ represents the additional tax in period 2 that is caused by pre-taxing the disability income insurance premiums in the first period.

An individual maximizes his or her expected value by electing to pay for the disability income insurance premiums with pre-tax dollars when: $TS1 > (Dis_{prob}) \times (Dis_{time}) \times (TC2)$. We demonstrate by example the case of a single individual age 42 with income of $50,000. The tax savings in year 1 (TS1) may be determined from Table 2 Panel A by subtracting $6,677 from $6,736. This results in tax savings in period 1 of $59.

Next, we determine the additional tax that the individual will pay in future years because the disability benefits will be subject to income tax. As shown in Table 2, an additional tax of $2,796 will be due in the years of receipt of the benefits. This annual amount is multiplied by 0.00202 (the probability of an individual becoming disabled from Table 1) to get an expected value of additional tax in the year of receipt of $5.65. The individual will receive the benefit for 10.0779 years (10.5779 years from Table 1 reduced by the six-month elimination period). Therefore, the expected value of the additional tax is $5.65 per year for 10.0779 years. We apply a 5% discount rate per year to the additional taxes to arrive at an expected additional tax cost of $44. As shown by this example, the tax savings from pre-taxing the disability insurance premiums is $15 greater than the expected value of the tax cost associated with the tax on the disability benefits in later years. A summary of the expected tax savings achieved by pre-taxing the disability income insurance premiums is

Table 3 Summary of expected value of tax savings for pre-taxing disability income insurance premiums disabled for mean length of time

Panel A: Single individuals

| | Income level | | | | | |
|---|---|---|---|---|---|---|
| Age | 25,000 | 50,000 | 75,000 | 100,000 | 125,000 | 150,000 |
| 22 | 5 | 14 | 15 | 18 | 15 | 13 |
| 27 | 5 | 11 | 10 | 8 | 2 | (4) |
| 32 | 6 | 16 | 15 | 15 | 8 | 0 |
| 37 | 7 | 17 | 12 | 7 | (7) | (21) |
| 42 | 8 | 15 | 3 | (12) | (38) | (65) |
| 47 | 8 | 9 | (19) | (56) | (107) | (161) |
| 52 | 22 | 49 | 31 | 11 | (34) | (84) |
| 57 | 9 | (11) | (86) | (186) | (312) | (444) |
| 62 | 21 | 46 | 25 | 1 | (48) | (102) |

Panel B: Married individuals filing joint tax returns

| Age | 25,000 | 50,000 | 75,000 | 100,000 | 125,000 | 150,000 |
|---|---|---|---|---|---|---|
| 22 | 5 | 10 | 9 | 28 | 31 | 40 |
| 27 | 5 | 9 | 5 | 22 | 23 | 29 |
| 32 | 7 | 13 | 9 | 32 | 34 | 43 |
| 37 | 9 | 14 | 6 | 33 | 33 | 40 |
| 42 | 12 | 16 | 1 | 31 | 25 | 27 |
| 47 | 16 | 17 | (13) | 18 | 1 | (10) |
| 52 | 29 | 44 | 17 | 98 | 95 | 113 |
| 57 | 29 | 17 | (55) | (21) | (73) | (122) |
| 62 | 29 | 42 | 13 | 92 | 86 | 101 |

shown in Table 3 for single (Panel A) and married filing jointly (Panel B) individuals for the six income levels and ages 22 through 62 in increments of five years.

### *5.1. Single individuals*

Single individuals generally achieve tax savings by pre-taxing the disability insurance premiums at lower income levels. For all single individuals with $25,000 in income, pre-taxing the disability income insurance premiums results in a higher expected value of tax savings. This is because if they were to become disabled, they would collect only $15,000 in benefits. Much of the $15,000 in income would be sheltered by the standard deduction ($5,350 in 2007) and the personal exemption ($3,400 in 2007). The remaining taxable income of $6,250 would be subject to tax rate of 10%, yielding a tax of $625.

As income increases, the standard deduction and personal exemption do not shelter as large a portion of their income, resulting in a larger tax in the year of receipt. Therefore, one would expect that at higher income levels the expected value of tax savings for pre-taxing disability insurance premiums would be negative. However, another factor, the age of the individual, also affects the expected value of tax savings. Generally, as shown in Table 1, the probability of becoming disabled increases with age. This increases the expected value of the tax cost if the disability benefits are taxable. Therefore, older single individuals are more likely to have a negative expected tax savings for pre-taxing disability insurance premiums.

This is shown in Table 3 for single individuals with incomes of $125,000 where the expected tax savings is negative for ages 37 and older.

The mean number of years of disability also affects the expected value of tax savings. One would expect that younger individuals would recover more quickly from a disability than an older individual. As shown in Table 1, the mean number of years of disability increases from ages 22 to 42. However, at age 47 the mean number of years of disability starts to decrease as individual get older. As explained in the note on Table 1, this is because most disability insurance policies only pay until the disabled individual reaches age 65. The effect of the policy limiting payment only until the individual is age 65 has the most pronounced effect on individuals age 62. This is shown in Table 3 where single individuals may have a higher expected value (or lower negative expected value) of tax savings for age 62 than for age 57. Again, this is because an individual age 62 will not be able to collect disability insurance for as long a time period as would an individual age 57.

Finally, the results for single individuals age 52 in Table 3 needs further explaining. As can be seen from Table 3, a pattern develops that as age increases, the expected value of the tax savings remains approximately the same or decreases. For all income levels above $25,000, the expected value of tax savings decreases between age 42 and age 47. However, for age 52, the pattern reverses. This change in the pattern of the numbers may be explained by the large drop in the mean number of years of disability that occurs between age 47 (9.6689 years) and age 52 (6.4508 years). A similar change in the pattern of the results appears between ages 57 and 62 and is again attributable to the large drop in the mean number of years of disability as shown in Table 1.

### *5.2. Married individuals*

The results for married individuals are similar to the results for single individuals. Generally, lower income levels and younger individuals have a positive expected value of tax savings for pre-taxing disability insurance premiums. Only a few married individuals have a negative expected value of tax savings. Primarily, these are higher income individuals who are age 57.

The major difference in the results for married individuals and single individuals is that, for a given level of income, married individuals have two personal exemptions, a larger standard deduction, and lower income tax rates. Therefore, fewer age and income combinations for married individuals have negative expected values for pre-taxing disability insurance premiums.

### *5.3. Presence of other income*

In the previous analysis, we assumed that the individual's salary was his or her only source of income. Although salary is the major source of income for most individuals, many individuals also have other types of income such as interest, dividends, and capital gains. If an individual is married, the spouse may have salary. We investigate the effect of additional income on the decision to pre-tax or post-tax the disability income premiums. For this analysis, we choose three levels of other income: (1) $5,000, (2) $10,000, and (3) $20,000.

Table 4 Summary of expected value of tax savings for pre-taxing disability income insurance premiums disabled for mean length of time with other income of $20,000

Panel A: Single individuals

| | Income level | | | | | |
|---|---|---|---|---|---|---|
| Age | 25,000 | 50,000 | 75,000 | 100,000 | 125,000 | 150,000 |
| 22 | 3 | 2 | 3 | 1 | (3) | 9 |
| 27 | 1 | (4) | (6) | (12) | (20) | (12) |
| 32 | 2 | (3) | (6) | (13) | (21) | (12) |
| 37 | 0 | (11) | (19) | (32) | (48) | (46) |
| 42 | (5) | (26) | (44) | (69) | (99) | (111) |
| 47 | (17) | (59) | (100) | (151) | (209) | (251) |
| 52 | (4) | (39) | (67) | (112) | (166) | (207) |
| 57 | (52) | (155) | (264) | (389) | (529) | (659) |
| 62 | (6) | (45) | (77) | (127) | (185) | (270) |

Panel B: Married individuals filing joint tax returns

| Age | 25,000 | 50,000 | 75,000 | 100,000 | 125,000 | 150,000 |
|---|---|---|---|---|---|---|
| 22 | 1 | (2) | 12 | 15 | 12 | 18 |
| 27 | (1) | (5) | 6 | 7 | 0 | 2 |
| 32 | (1) | (6) | 10 | 12 | 4 | 8 |
| 37 | (3) | (12) | 5 | 5 | (10) | (9) |
| 42 | (7) | (24) | (6) | (12) | (39) | (46) |
| 47 | (17) | (50) | (35) | (52) | (105) | (131) |
| 52 | (10) | (43) | 11 | 7 | (43) | (46) |
| 57 | (44) | (125) | (119) | (172) | (299) | (382) |
| 62 | (12) | (47) | 4 | (2) | (56) | (63) |

Other income increases the tax rate in the year the premiums are paid and in the years the benefits are received. The changes to the previous analysis are most pronounced at the $20,000 other income level. We show the effect of $20,000 of other income in Table 4.

Most single individuals age 27 and over, and those with income of $50,000 and over, are better off to post-tax the disability income premiums. At this level of other income, the individual is already using his or her standard deduction and exemption amounts. Therefore, the tax cost in year 2 for including the disability income in taxable income is much greater.

The result for married individuals is a little different. Although most married individuals fare better by post-taxing their premiums, younger married individuals with higher income levels are slightly better off by pre-taxing their disability premiums.

In comparing the results with the case where the individual had no other income, it is clear that the presence of other income changes the optimal decision. Although the changes were only slight at a level of $5,000 of other income, the results are dramatic at a level of $20,000 of other income.

### *5.4. Effect of permanent disability*

In the initial analysis, we assumed that the individual remains disabled for the mean period of time for individuals incurring a disability at each given age. We extend the analysis to

Table 5 Summary of expected value of tax savings for pre-taxing disability income insurance premiums disabled to age 65

Panel A: Single individuals

| | Income level | | | | | |
|---|---|---|---|---|---|---|
| Age | 25,000 | 50,000 | 75,000 | 100,000 | 125,000 | 150,000 |
| 22 | (1) | (12) | (37) | (69) | (107) | (146) |
| 27 | (1) | (15) | (42) | (78) | (119) | (162) |
| 32 | 1 | (10) | (37) | (73) | (115) | (160) |
| 37 | 1 | (11) | (43) | (86) | (137) | (190) |
| 42 | 1 | (17) | (61) | (119) | (188) | (260) |
| 47 | (2) | (35) | (107) | (203) | (314) | (429) |
| 52 | 4 | (31) | (127) | (255) | (409) | (570) |
| 57 | (5) | (72) | (207) | (389) | (597) | (815) |
| 62 | 14 | 14 | (37) | (104) | (195) | (293) |

Panel B: Married individuals filing joint tax returns

| Age | 25,000 | 50,000 | 75,000 | 100,000 | 125,000 | 150,000 |
|---|---|---|---|---|---|---|
| 22 | 5 | (1) | (23) | (25) | (43) | (63) |
| 27 | 5 | (3) | (26) | (30) | (50) | (74) |
| 32 | 7 | 1 | (23) | (20) | (40) | (61) |
| 37 | 9 | 2 | (27) | (23) | (46) | (70) |
| 42 | 12 | 1 | (38) | (34) | (66) | (100) |
| 47 | 16 | (3) | (66) | (71) | (124) | (184) |
| 52 | 29 | 8 | (80) | (63) | (131) | (204) |
| 57 | 29 | (10) | (128) | (144) | (245) | (363) |
| 62 | 29 | 28 | (25) | 29 | (3) | (23) |

investigate the effects of individuals remaining disabled through age 65. All computations remain the same except for the duration of the disability.

We continue the previous example of a single individual age 42 with income of $50,000. As previously determined, the additional tax that the individual will pay in future years because the disability benefits will be subject to income tax is $2,796. This annual amount is multiplied by 0.00202 (the probability of an individual becoming disabled from Table 1) to get an expected value of additional tax in the year of receipt of $5.65. However, if the individual remains disabled until age 65, he will collect disability benefits for 23 years. The additional tax cost ($5.65 per year for 23 years discounted at 5%) exceeds the tax benefit of $59 by $17. Therefore, the individual would choose to post-tax the disability insurance premiums. A summary for all age increments and income levels is presented in Table 5.

As shown in Table 5, most individuals whose income is greater than $25,000 should choose to pay for the premiums with post-tax dollars. Generally, the higher the income level, the more certain it is that the individual should make this choice. These results differ quite substantially from those presented in Table 3. A risk averse individual who is concerned that he may become permanently disabled would most likely choose to post-tax the premiums.

### 5.5. Limitations of the study

We have made a simplifying assumption that the taxpayers use the standard deduction, in comparing the costs of paying for disability insurance with pre-tax or post-tax dollars. U.S. Department of the Treasury (2007) shows that 62.6% of the individual income tax returns filed for 2006 used the standard deduction. The remaining 37.4% of returns filed for 2006 used itemized deductions. One of the problems with modeling for itemized deductions is that an individual's itemized deductions would likely change if he or she becomes disabled. Some itemized deductions, such as state income tax and charitable contributions, would likely decrease with a reduced level of income. However, medical expenses might increase depending on the individual's specific disability. Property tax would stay about the same if the individual is able to remain in the same home. However, with a lesser amount of income, the individual might have to move to a less expensive house and property tax would likely decrease. Because of uncertainties associated with itemized deductions, we limit our analysis to individuals who use the standard deduction.

The study is also limited in that the data are available only for ages 22 through 62 and at five-year intervals. If a more detailed data set were available, we could further analyze some of the multiple sign reversals that occur in Table 3. An example of such a multiple reversal occurs for individuals who are married filing jointly with income of $150,000. At age 42, 52, and 62, it is more beneficial to pre-tax the insurance premium. However, it is more beneficial to post-tax the premiums at ages 47 and 57.

## 6. Conclusions

This paper demonstrates that the decision to pre-tax or post-tax disability insurance depends on several factors, including the amount of income the individual earns, marital status, age, the cost of disability insurance premiums, and the federal income tax law. Sensitivity analysis shows that the more expensive the insurance premiums, the more likely pre-taxing the premiums results in the greater tax savings.

Although the expected tax savings is greater for many individuals who pre-tax disability income insurance premiums, it is likely that many individuals choose to pay the premiums with post-tax dollars. One possible explanation is that, whereas the probability of a disability is fairly small in a given year, a risk averse individual may rather pay a small amount of additional tax in the year of the premium and avoid a much higher tax if he or she becomes disabled and collects disability income. The relative amounts were shown in the previous example for a single individual age 42 with $50,000 of income. Pre-taxing the disability benefits resulted in reduced tax of $59, whereas the tax would be $2,796 in the year when he or she collected disability benefits. Therefore, the individual might compare the two values and, even though the probability of becoming disabled within the year is only 0.00202, he or she might choose to avoid the $2,796 of tax in the event of disability.

Individual risk preferences enter into the decisions both to purchase disability insurance, and whether to pre-tax or post-tax the premiums if disability insurance is purchased. Expected utility theory posits that increases in wealth add to utility at a decreasing rate

consistent with risk-averse behavior (Shoemaker, 1980, p. 12). Research on insurance behavior finds that individuals exhibit inconsistent behavior. Findings suggest that lower income individuals are more risk seeking than high income individuals. However, in addition it appears that the context in which choices are presented influences preference (Shoemaker, 1980, Chapter 5).

Noting the scarcity of research in the disability insurance area, Cox (1991) encourages academic researchers to investigate issues relative to disability insurance. He suggests several possible topics, including the decision to purchase disability insurance. Future research might survey individual purchasers of disability insurance policies to determine what factors they consider when making the choice to either pre-tax or post-tax disability insurance premiums. It is possible that individuals choose to post-tax the premiums to avoid the large tax cost if they do become disabled. This reasoning is supported by Kahneman and Tversky's (1979) prospect theory that states overweighting low probabilities may explain the attractiveness of insurance. Such a study could address questions such as whether individuals' risk preferences affect the pre-tax/post-tax decision or whether individuals are just unaware of the probabilities of incurring a disability.

Rev. Rul. 2004–55 allows purchasers of disability insurance to make the decision to pre-tax or post-tax the premiums on an annual basis. Therefore, individuals may elect whichever treatment is most advantageous in a given year. Future research might involve a longitudinal study that examines individuals' decisions to pre-tax or post-tax the premiums over a period of time. Given that the results in Table 3 demonstrate that the expected value of tax savings may change from positive to negative then back to positive as the individual ages, it would be interesting to see if individuals change their elections over time.

## Notes

1. 42 U.S.C. § 216(i)(1).
2. Annual premiums varied from $24.70 to $67.10 per $100 of monthly benefit, with a mean of $42.04. Cox and Gustavson point out that most of the insurers in their study provided quotes for only one, and at most two, elimination periods. The elimination periods varied between 30 and 180 days with a mean of 48.41 days.
3. A policy that provides a 60% replacement rate will have an effective after-tax replacement rate of greater than 60% when the premiums are paid with post-tax dollars. The after-tax replacement rate may also exceed 60% when the premiums are paid with pre-tax dollars if the individual's income tax rate decreases when he or she receives the benefits.

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